



Central Embarcadero Quick-Build Evaluation Report

October 2022

Introduction

The Central Embarcadero Quick-Build Project was implemented in early 2022 to improve safety and access for people walking, biking, and rolling along and across the Central Embarcadero (Mission Street to Broadway). It extended an earlier quick-build project in 2020 that installed a two-way bikeway between Howard and Mission Streets. The project tripled the bikeway's length by extending it to Broadway, upgraded pedestrian crossings, and made a suite of curb-management changes in the area. It is part of the larger Embarcadero Enhancement Program of waterfront transportation safety and access improvements.

As part of the SFMTA's Safe Streets Evaluation Program, the project team evaluated the effectiveness of the project in meeting the program's overarching goals of mobility, effective design, safe behavior, ease of navigation, and perception of safety. Utilizing the SFMTA's "Standard Operating Procedures" for data collection and analysis, the team developed a set of metrics for evaluation of the project, outlined below. The success of each metric is generally qualified as "positive," "negative," or "neutral/inconclusive."

Definitions

- **Pedestrian:** A person walking or using a powered or unpowered mobility device to assist with a mobility impairment.
- **Bike rider:** A person riding a bicycle or electric-assist bicycle.
- **Scooter rider:** A person riding an electric scooter or similar personal device.
- **Wheeled User:** A person riding a bike, scooter, skateboard, or other powered or unpowered wheeled device (combines and expands the above two).
- **Bikeway:** A road, route, path, or way designated for use by bicycle, inclusive of the following facilities:
 - **Unprotected Bike Lane:** A bikeway within the roadway delineated by paint.
 - **Protected Bikeway:** A bikeway within the roadway delineated by a vertical separation element, such as flexible channelizing posts or a parking/loading zone.
 - **Two-way Protected Bikeway:** A protected bikeway that accommodates bi-directional travel, often including bicycle travel that is "contra-flow" to the direction of travel of the adjacent motor vehicle travel lane.

Safety

Are bike/scooter/skateboard riders moving off the promenade into the bikeway?

	<p>A substantial majority of people on bikes/scooters ride in the new bikeway, with robust growth on weekdays and since the promenade safety signs were installed.</p>
---	---

A principal project goal is to relieve pressure on the Embarcadero's shared-use promenade by extending the two-way protected bikeway through the Ferry Building area from Mission Street to Broadway. This bikeway provides a dedicated space for riding bikes, scooters, skateboards, and other personal mobility devices away from faster-moving vehicle traffic and the pedestrian-priority promenade.

This metric reviews whether bike and scooter riders moved off the promenade into the two-way protected bikeway in the Central Embarcadero area, where there is a two-way protected bikeway (Folsom Street to Broadway). The project team collected data at each intersection before and after implementing the changes. They organized it into a 'data dashboard' that tracks where different types of active-transportation users travel.

		AM peak (8am-9am)		PM peak (5pm-6pm)		Weekend peak (Sat 11:15am-12:15pm)	
		Promenade	Bikeway	Promenade	Bikeway	Promenade	Bikeway
Oct 2021¹ (before)	Bikes	43%	57%	39%	61%	22%	78%
	Scooters	69%	31%	58%	42%	28%	72%
	Combined	47%	53%	43%	57%	23%	77%
Apr 2022 (after)	Bikes	35%	65%	22%	78%	22%	78%
	Scooters	37%	63%	37%	63%	16%	84%
	Combined	35%	65%	25%	75%	21%	79%
Aug 2022 (after)	Bikes	13%	87%	20%	80%	4%	96%
	Scooters	19%	81%	27%	73%	15%	85%
	Combined	14%	86%	22%	78%	6%	94%

The results show that, immediately after the project, most bike and scooter riders were riding in the bikeway instead of the promenade. During the weekday morning peak hour, when promenade activity is lower, 65% of wheeled users were in the bikeway. This number increased to 75% in the afternoon peak hour (78% of bike riders and 63% of scooter riders). On the weekend, near the lunch hour, 79% of wheeled users chose the bikeway (78% of bike riders and 84% of scooter riders).

Four months after the bikeway was installed and one month after special safety signs were added – encouraging users to use the new facility and promoting the requirement

¹ Average of two weekdays for AM peak and PM peak

for e-bikes/scooter riders to do so – the results improved. 86% of wheeled users were in the bikeway during the weekday morning peak hour and 78% during the afternoon peak hour. On the weekend, near the lunch hour, 94% of wheeled users chose the bikeway.

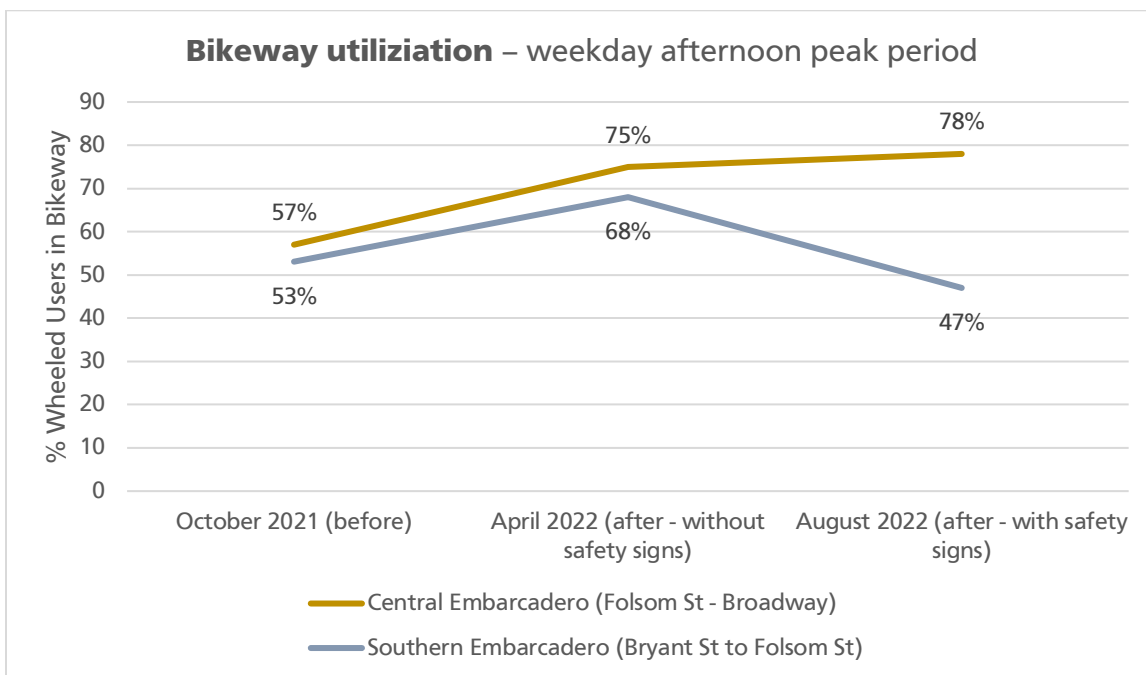
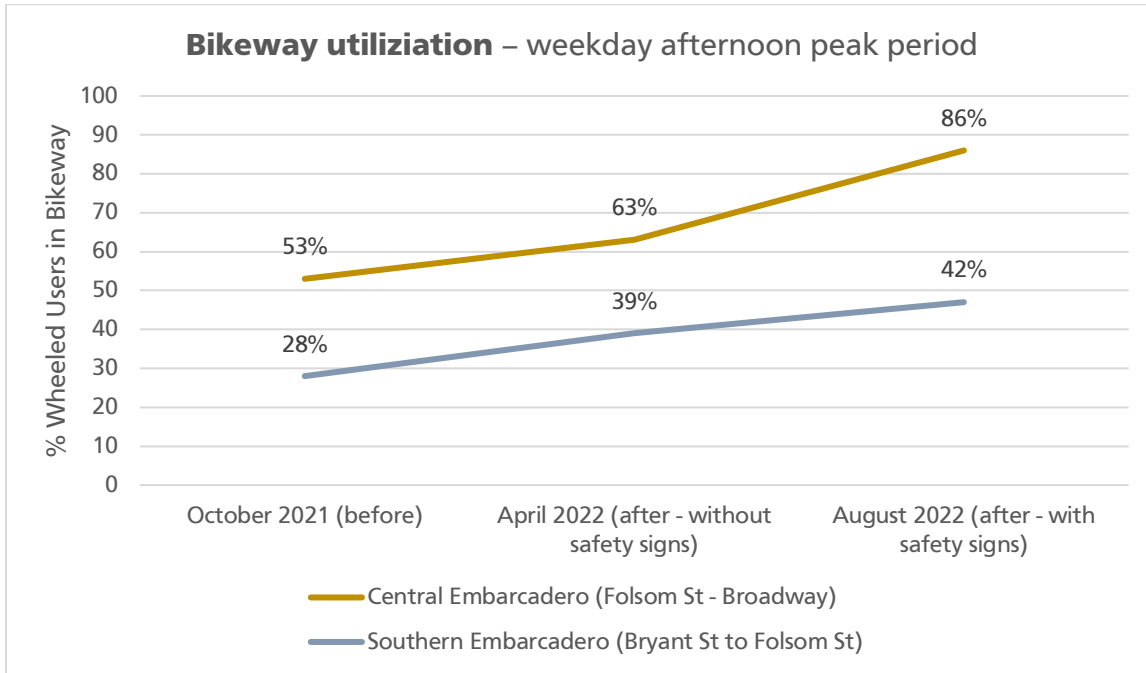
Compared with data collected in October 2021, just before implementing the project, wheeled users moved from the promenade into the bikeway (prior, it was an unprotected northbound-only bike lane). During both weekday peak periods, the proportion of riders in the bikeway has increased by 21% to 33%, with especially significant gains for those on scooters (e.g., 50% growth in the weekday morning-peak period). During the weekend peak period, nearly fourth-fifths of bike riders and three-fourths of scooter riders were already in the bikeway; after the project, 85% of scooter riders were riding off the promenade.

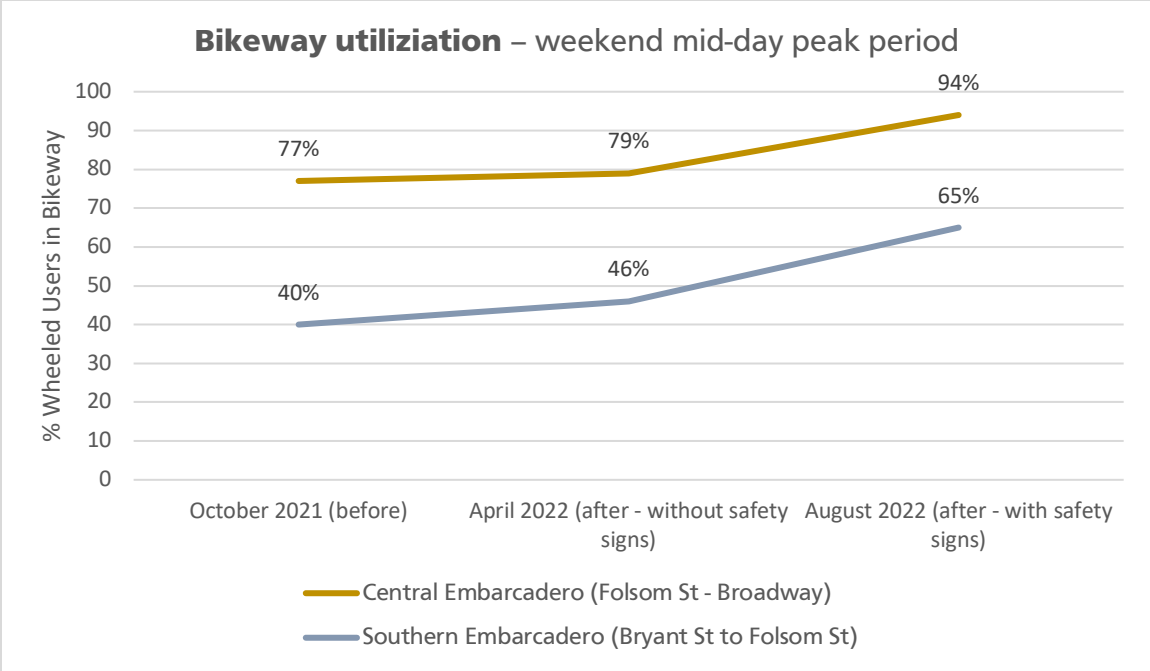


Image of an electric-skateboard rider riding south in the two-way bikeway in front of the Ferry Building

With 65-79% of wheeled users choosing to ride in the bikeway, the project successfully relieves pressure on the Embarcadero's shared-use promenade. While it is difficult to tease out the differences in results between measurement periods, it appears more bike and scooter riders choose to use the two-way bikeway during busier periods (weekday and weekend afternoons). As this data was collected before permanent metal signs encouraging people to move from the promenade into the bikeway, the proportion of folks in the two-way bikeway may increase further. Staff will recollect data for this metric

after a 'settling-in' period to see if the balance of riders in the bikeway increases after the installation of signs.





In addition to tracking bikeway utilization within the quick-build project area, the project team reviewed pre- and post-project promenade/bikeway splits within the Southern Embarcadero segment between Folsom and Bryant Streets – where there is not a two-way protected bikeway – to provide context for Central Embarcadero bikeway utilization metrics and to evaluate potential ‘downstream’ effects of Promenade safety sign installation. Staff reviewed wheeled users in the northbound and southbound one-way on-street bike lanes and users traveling in either direction on the promenade.

The observed bikeway utilization by wheeled users in the Southern Embarcadero was consistently lower than in the Central Embarcadero for all periods, suggesting that the waterside two-way protected bikeway encourages wheeled users to ride in the on-street bikeway rather than the promenade. Additionally, the bikeway utilization generally increased over time, suggesting that promenade safety signs throughout the greater Embarcadero corridor have promoted wheeled use of both two- and one-way on-street bikeways.

Though it is not straightforward to determine the number of wheeled users using electric devices, which are currently prohibited on the promenade, we can assume a supermajority of scooters on the Embarcadero has an electric motor. Accordingly, further progress can be made on moving scooter users into the on-street bikeway, especially on weekdays.

Further, whether powered with an electric motor or manually ridden, wheeled users who continue to ride the promenade may cause conflicts with pedestrians. The following metric discusses the speeds of wheeled users using the promenade.

Are faster bike, electric bike, scooter, and skateboard riders in the bikeway?



The minority of people who continue to ride bikes/scooters on the promenade ride slowly.

Safety and comfort for people walking along the Embarcadero promenade are heavily influenced by the speed of wheeled device users who choose to ride on the promenade instead of in the bikeway. While the preferred behavior for these users is to ride in the bikeway, some users, such as those biking with families, those new to riding wheeled devices, or those who wish to travel very slowly, may reasonably choose to continue to ride on the promenade.

This metric reviews the speeds of people riding bikes, e-bikes, scooters, skateboards, and other wheeled devices (wheelchairs and other assistive mobility devices excluded) on the Embarcadero promenade. The project team performed thirty-minute speed surveys at the following three locations along the bikeway during the weekend (11am - 1pm) and weekday (4-6pm) peak periods.


Pier 14 (between Howard St and Mission St)		
	Number of wheeled promenade users	Average promenade speed
Weekday PM peak	54	9.9 mph
Weekend mid-day peak	28	7.3 mph

Pier ½ (between Washington St and Ferry Building)			
	Number of wheeled promenade users	Average promenade speed	Average on-street bikeway speed
Weekday PM peak	28	7.3 mph	12.5 mph
Weekend mid-day peak	10	6.0 mph	

Pier 7 (South of Broadway)			
	Number of wheeled promenade users	Average promenade speed	Average on-street bikeway speed
Weekday PM peak	29	9.1 mph	12.8 mph
Weekend mid-day peak	16	7.1 mph	

During peak periods, wheeled user speeds on the Embarcadero promenade travel slowly relative to typical on-street speeds, especially in areas with the highest pedestrian volumes. Further, the counts of wheeled users on the promenade were very low. During the observed times, average user speed did not exceed 10 mph, nor did wheeled-user frequency exceed two per minute. These takeaways are in line with the intended use of the Embarcadero Promenade.

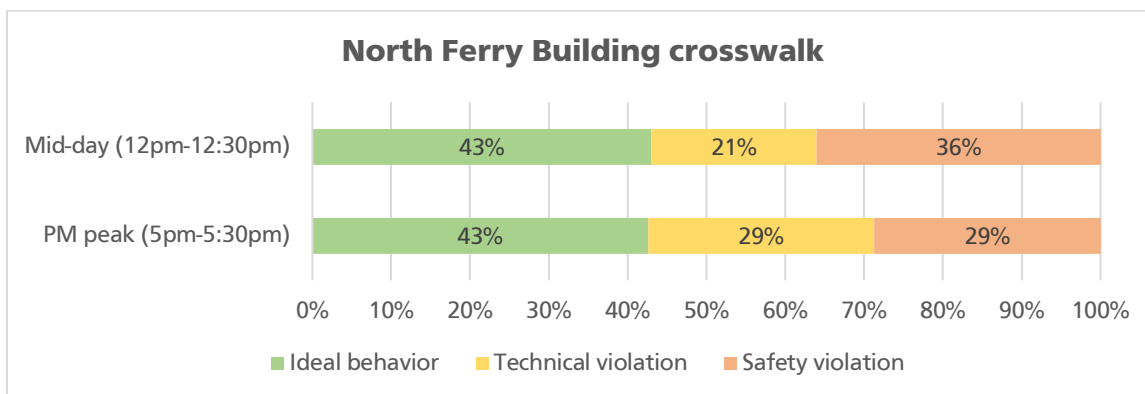
Are bike/scooter riders yielding at mid-block crosswalks?

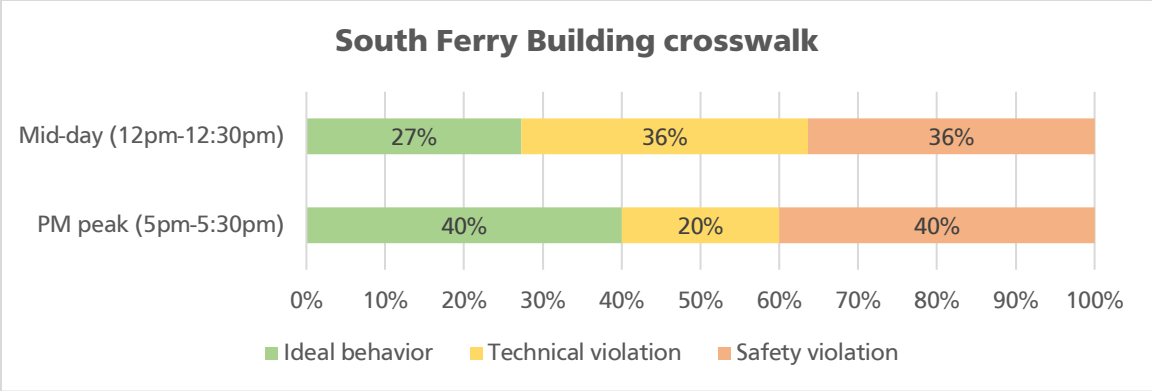
	<p>Two-thirds of bike/scooter riders yield or give space to pedestrians, but the other third continue at speed.</p>
---	--

Between signalized intersections, mid-block crosswalks over the bikeway provide access to each loading zone in the project area. They are marked with high-visibility crosswalk markings and ‘yield-teeth’ triangles impressing the need to yield to people crossing on foot.

This metric reviews whether bike and scooter riders yielded to people crossing the bikeway in the marked mid-block crosswalks. Appreciating the unique riding characteristics of bicycles (that they’re more challenging to start and stop than motorized vehicles) and the resulting reluctance for riders to make complete stops with a foot down, the project team applied a tiered review, breaking observations of yielding into three buckets:

- **Ideal behavior:** Rider slows/yields to the pedestrian within a comfortable distance or makes a complete stop
- **Technical violation:** Rider passes around the pedestrian in the hatched bikeway buffer slowly without conflict
- **Safety violation:** Rider makes no effort to yield and stays in the bikeway





Across all periods, 84-93% of people riding bikes/scooters in the bikeway do not encounter a pedestrian crossing mid-block. The tables above represent how people on bikes/scooters behave when they do meet a pedestrian crossing.

The results show that 60-71% of bike/scooter riders either stop and yield to pedestrians outright or give space and pass slowly around them. 29-40% do not provide space, continuing at speed in the bikeway.

Ideally, nearly all riders would yield or give space to pedestrians when crossing, so there is yet progress to be had. Staff will continue to monitor this metric and consider further enhancements to these mid-block crossings in the capital phase of the project, which could include building raised crosswalks, rumble strips, and other traffic calming measures in the bikeway.

Are bike/scooter riders stopping at bike traffic signals (primary crosswalks)?

	<p>People on bikes/scooters generally stop at bike signals, but behavior varies, with crosswalks near the Ferry Building seeing less compliance.</p>
---	---

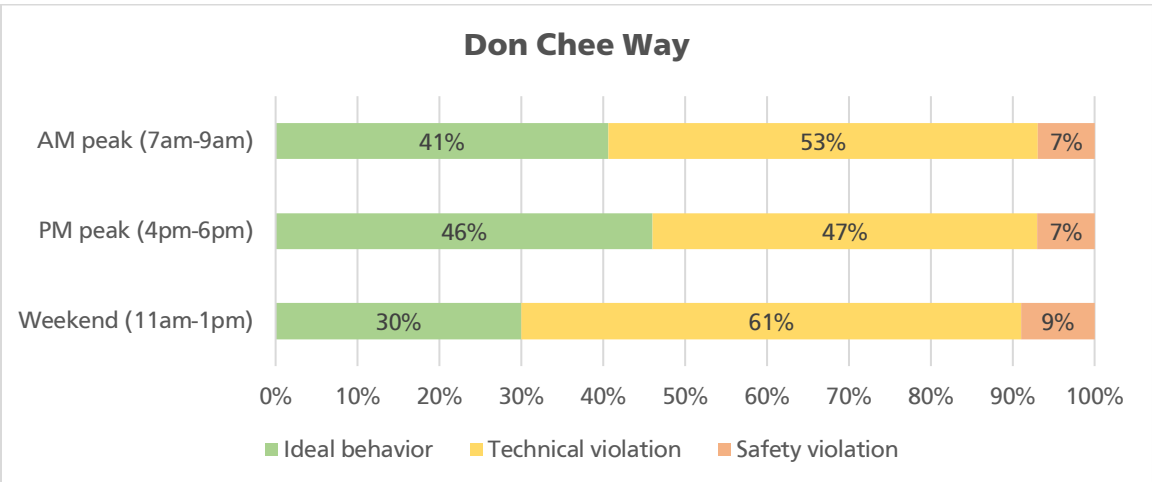
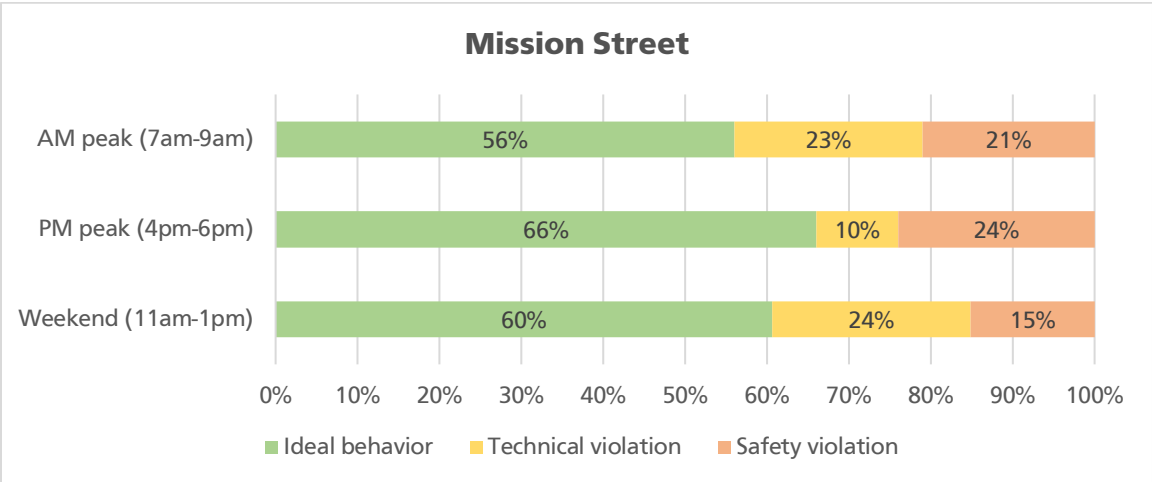
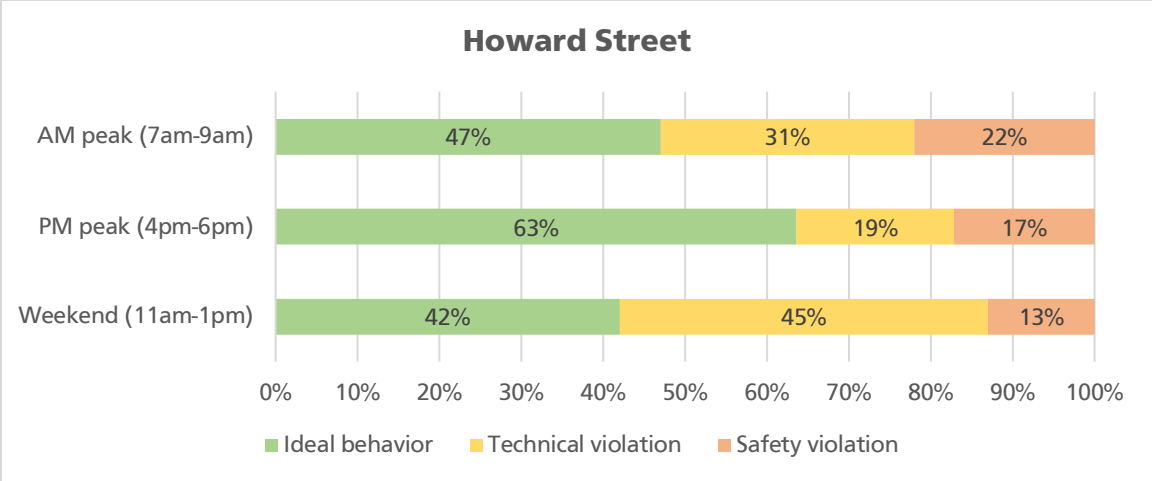
Each intersection with a traffic signal for vehicle traffic has a dedicated bicycle traffic signal for both northbound and southbound bikeway traffic. These bike signals work the same as standard green/yellow/red signals and control all users traveling in the bikeway.

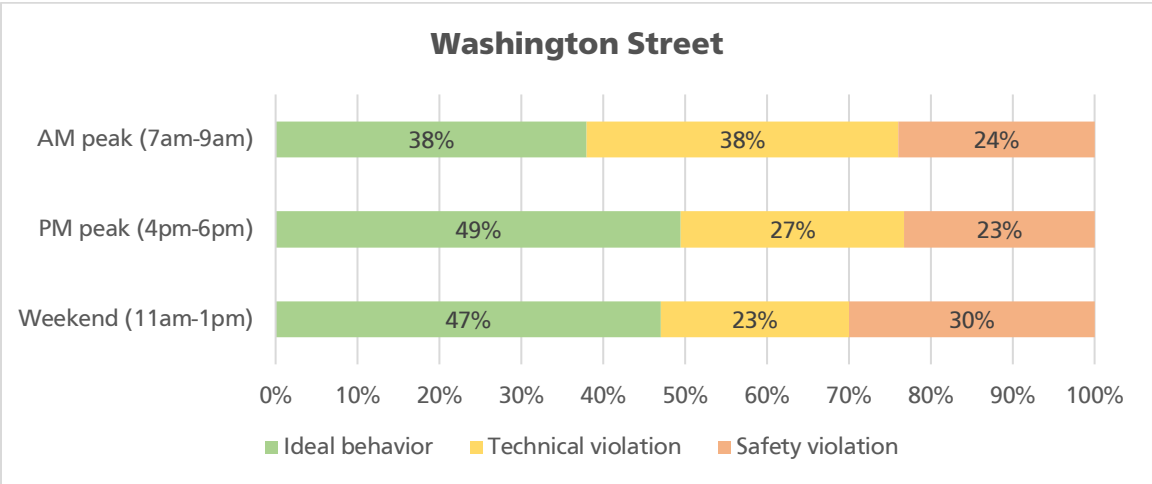
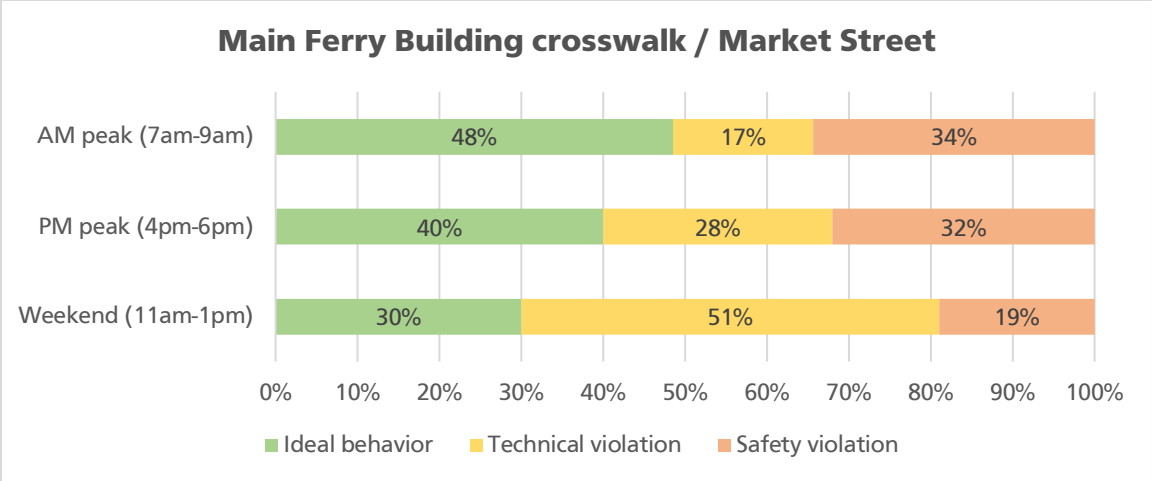


Image of education panel drawing bikeway users' attention to new bike traffic signals

This metric reviews whether bike and scooter riders obeyed the bicycle traffic signals. Appreciating the unique riding characteristics of bicycles (that they're more challenging to start and stop than motorized vehicles), the project team also applied a tiered review, breaking observations of compliance into three buckets:

- **Ideal behavior:** Rider stops and waits until the bike signal turns green
- **Technical violation:** Rider stops and proceeds if there are no pedestrians to yield to
- **Safety violation:** Rider does not stop at the bike signal, or stops and proceeds and makes a close call with a pedestrian





While results vary by location and time, there are some high-level findings. In 10 of 15 periods, the *'ideal behavior'* category – wherein a rider stops at red bike traffic signals and waits until the light turns green – accounts for the highest proportion of riders. Further, in four of five AM/PM-peak periods, most riders stop and wait at bike signals. Results on weekends are more mixed, though *'safety violations'* – wherein a rider doesn't stop or makes a close call with a crossing pedestrian – are relatively low, except at the main Ferry Building crosswalk and Washington Street, where many people cross.



Image of a pedicab rider stopping at a red bike traffic signal for crossing pedestrians

Despite these encouraging findings, *'safety violations'* are above 10% in 12 of 15 periods, rising above 20% in eight periods. Observations of *'safety violations'* at the main Ferry Building crosswalk and Washington Street are particularly high. This result is partly due to the high number of pedestrians crossing at these locations relative to the intersections to the south (Howard Street and Mission Street), resulting in a greater chance of conflicts between users.

Conversely, the nearby Don Chee Way crosswalk sees relatively high compliance, likely due to vehicle cross-traffic in and out of the Ferry Building driveway. Other crossings are across T intersections with no vehicle cross-traffic, a condition that tempts bike/scooter riders to continue against a red bike traffic signal.

Due to the tendency of bike/scooter riders to not make full stops (especially at T intersections without vehicle cross-traffic) and the temptation to get ahead of the signal turning green to be more visible to vehicle traffic, a good number of *'technical violations'* will likely remain. The goal should be to reduce the number of *'safety violations'* — riders who do not stop at all or pass a pedestrian too closely.

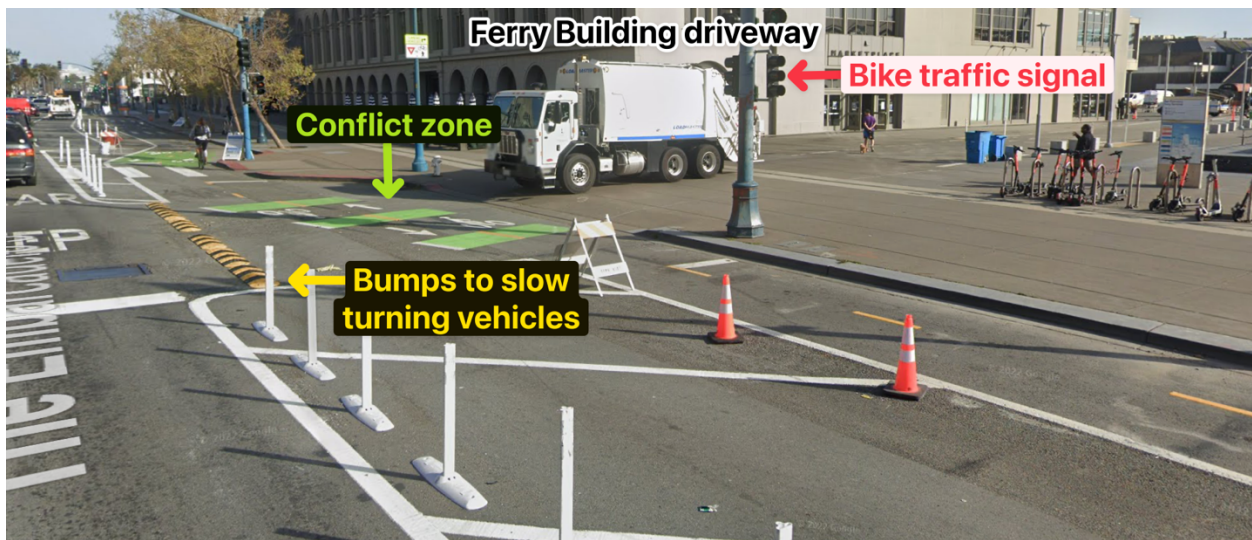
Are people driving yielding at 'conflict zones' (e.g., driveways)?



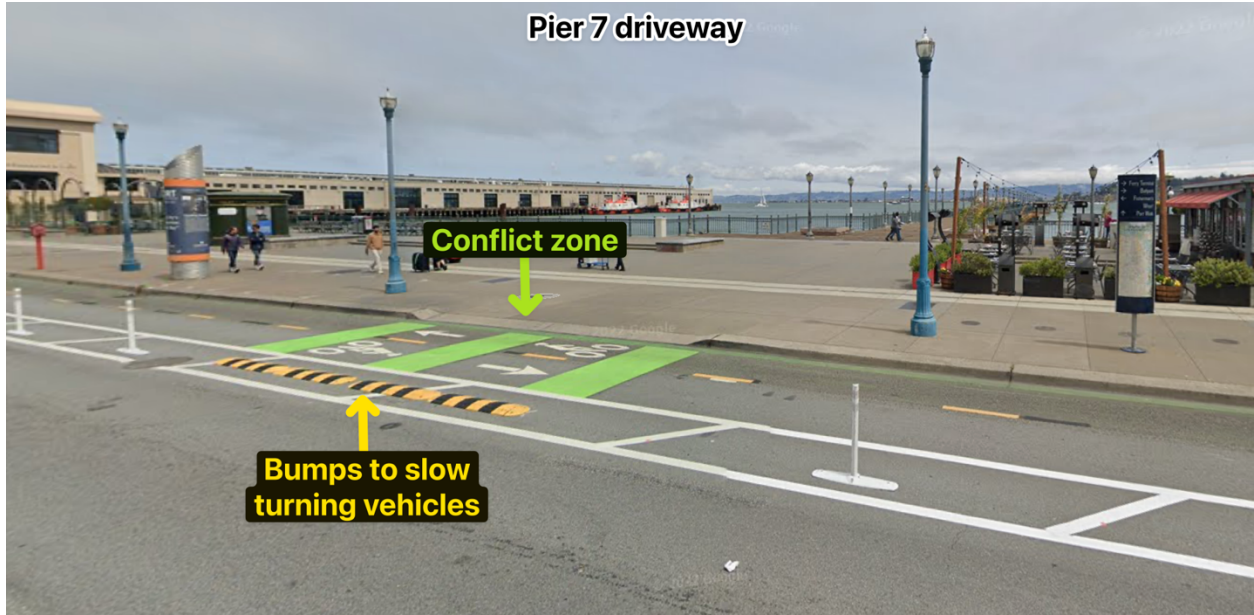
Driver yield compliance at conflict zones is relatively low, however few "close calls" were observed.

The two-way bikeway provides physical separation from motor-vehicle traffic for wheeled users and pedestrians. However, drivers can turn into driveways and across the bikeway and promenade to access waterside destinations at specific access points. In these situations, people driving must yield to promenade and bikeway users. This metric evaluates the extent to which conflicts in these areas occur.

The project team reviewed yielding compliance by drivers turning in and out of two driveways within the project area during two-hour AM-peak and PM-peak periods. The team also tracked "close calls" between drivers, promenade, and bikeway users. A "close call" refers to an instance when drivers and people walking or bicycling make sudden, reactive moves to avoid a collision with one another and is defined by a set of qualitative criteria developed by the SFMTA. Close call data can indicate the degree of safety people walking and bicycling experience in conflict zones.



Ferry Building driveway		
	Driver yield frequency	Number of close calls
With person walking	55%	0
With person bicycling	60%	0



Pier 7 driveway		
	Driver yield frequency	Number of close calls
With person walking	72%	0
With person bicycling	93%	0

This survey showed relatively low yield compliance by people driving in conflict zones, particularly at the busy Ferry Building crosswalk. Because of the high numbers of people walking and bicycling on the Embarcadero, people driving may need to wait longer than usual for a clear path of travel through the conflict zone, often resulting in them 'squeezing through' after a while. However, it is positive that the staff observed no close calls. Further, lower compliance for this metric isn't necessarily indicative of an unsafe condition, as interactions are low-speed, but could contribute to lower comfort levels for bikeway and promenade users.

The project team should evaluate adding supplementary signage, striping, and vertical separation elements to increase yield compliance.

Are loading/parked vehicles blocking the bikeway or travel lanes?



The physical separation of the bikeway generally functions well to keep motor vehicles from blocking the bikeway, however some incidents do occur.

Along the water side of the Embarcadero between Mission Street and Broadway, all curb space has moved away from the curb to protect the now-curbside bikeway from vehicle traffic. The physical protection of the bikeway reduces conflicts between people driving, parking, and bicycling. A hatched area adjacent to the 'floating' parking/loading zone is space for vehicle doors to open and people/goods to be loaded.

This metric tracks how often vehicles block the two-way bikeway or travel lane. The project team reviewed driver behavior during one typical weekday AM and one PM peak period and one typical weekend midday peak period at three locations where vehicle incursion into the bikeway is possible.

	Average hourly incidents
Ferry Plaza driveway	1
North of main Ferry Building crosswalk	0.66
Pier 7 driveway	0.33

The initial survey counted very few blocked-bikeway incidents. Subsequent observations and stakeholder feedback did reveal ongoing concerns with improper vehicle loading and blockage of the bikeway.

To further reduce the potential for bikeway and crosswalk blockages, the project team implemented design changes to discourage drivers from entering the bikeway. Additional flexible posts were added to the Ferry Building main crosswalk to reduce the clear width in which drivers can access the curb through the crosswalk.

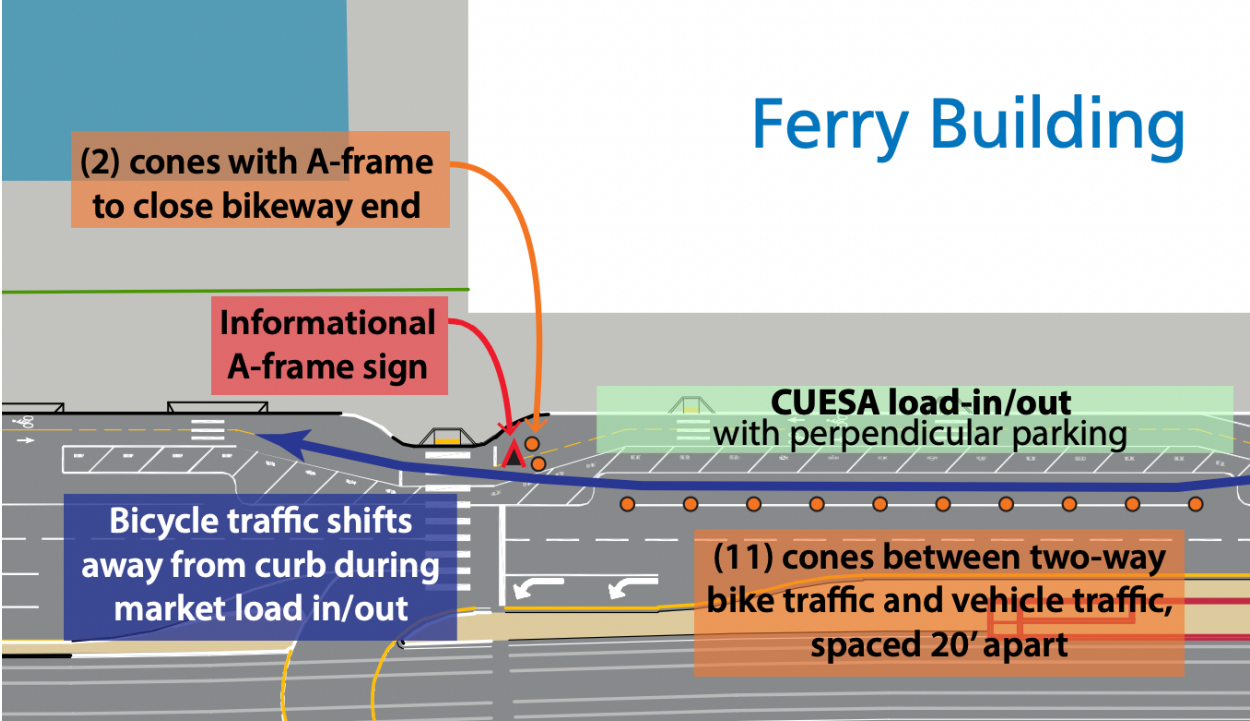


How is the farmers' market load out configuration working for bikeway safety?

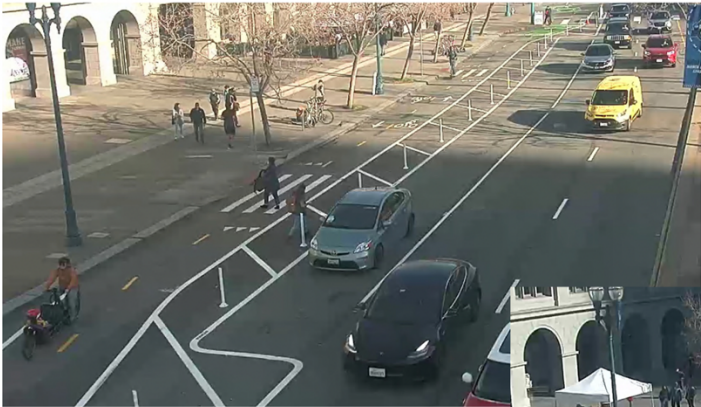
	<p>The adjustments made by farmers' market staff to operate with the new bikeway effectively maintain safety and access for vendors, customers, and bikeway users. However, vehicles are often parked both at the curb and in the floating spaces during the afternoon load-out.</p>
--	--

The Ferry Building hosts a farmers' market three days a week (Tuesday, Thursday, and Saturday). Foodwise, the non-profit organization which operates the market, manages parking and loading activity in the fronting 'floating' load zones throughout the day, accommodating restaurant chef parking, a "veggie valet", and other activities. At the start of the market in the early morning and again in the early/mid afternoon, market vendors load in/out by backing trucks/vans perpendicularly to the curb and blocking the curbside bikeway. With cones and signs, market staff detour bike/scooter riders into the area alongside the travel lanes designated for loading during all other periods. This flexible arrangement provides efficient vendor loading where goods are not loaded across the bikeway.

Ferry Building



Market load-in/out deployment on the north end of the Ferry Building



Typical layout

During market load-in/out
(1 hr early morning + 1 hr afternoon)



Images showing the typical bikeway layout compared with the market load-in/out periods



The bikeway shifts away from the curb during market load in/out to make space for vendors.

Slow down, follow the cones, and look out for vehicles moving to and from the curb.

Visit sfmta.com/Embarcadero to learn more about efforts to make the Embarcadero safer for all travelers.



311 Free language assistance / 免費語言協助 / Ayuda gratis con el idioma / Бесплатная помощь в переводе
/ Trợ giúp Thông dịch Miễn phí / Assistance linguistique gratuite / 無料の言語支援 / 무료 언어 지원 / Libreng tulong
para sa wikang Filipino / การช่วยเหลือทางภาษาฟรี / 免費語言協助 / 311 免費語言協助 / 311 免費語言協助 / 311 免費語言協助

Poster explaining the bikeway shift during market load-out

This metric is a qualitative review of how this configuration works for the safety of people bicycling based on staff observations and public feedback, including from people on bikes/scooters and farmers' market staff.

Since implementation, SFMTA staff has observed the farmers' market load-in/out operations regularly. They also solicited feedback from Foodwise, Hudson Pacific Properties (the real estate company managing the Ferry Building), and others. The following summarizes the takeaways.

- The farmers' market is highly operationalized. Though the changes brought an additional burden, market staff have been able to build on their experience with holding vehicle and pedestrian traffic to help vendors watch for bikes/scooters when pulling to/from the curb.
- The traffic cone layout with informational A-frame signs (explaining the purpose of the arrangement) effectively guides bike and scooter riders away from the curb. The bright-orange cones stand out visually against the adjacent vehicle traffic.

- With some regularity, vendors will load from the 'floating' loading area while others are correctly positioned at the curb, blocking the bicycle/scooter path of travel. Similarly, mid-day chef parking doesn't always clear out of the 'floating' loading zones. While challenging to manage this dynamic space perfectly, there is room for improvement in moving all vehicles to the curb during load-in/out periods.
- If there is interest, it could be worthwhile to test the effectiveness of conducting the market load-in/out from the typical 'floating' loading position, perhaps during the off-season (winter through early spring) when fewer vendor vehicles are present.

Have vehicle speeds changed?

	There are no clear trends to describe changes in vehicle speeds before and after the project's construction.
---	---

San Francisco's Vision Zero Policy commits to reducing fatal and serious-injury collisions by slowing motor vehicle speeds. Following the policy, a project goal is to reduce vehicle speeds by physically narrowing the portion of the roadway allocated for vehicle traffic.

The project team surveyed vehicle speeds at several mid-block segments in fall 2021 and spring 2022 to evaluate the effects of the bikeway installation and associated changes to roadway geometrics on vehicle speeds. Because of discrepancies in the speed survey locations, it is impossible to compare directly the 'before' and 'after' speeds. However, the speed survey data below suggests general trends within the project area.

Between Clay St and Don Chee Way		
Sep 2021 (before)		
	Average speed	85th percentile speed
Northbound	23.8 mph	31.2 mph
Southbound	18.7 mph	26.2 mph

Between Washington St and Pier 5		
Apr 2022 (after)		
	Average speed	85th percentile speed
Northbound	27.4 mph	33.4 mph
Southbound	24.3 mph	31.9 mph

While the before and after speed results are not at the same locations and cannot be directly compared, vehicle speeds remain high along the Central Embarcadero corridor. This result may indicate the need for additional traffic-calming measures and the physical separation of the bikeway north of Broadway and south of Folsom Street to improve safety for people biking.

Connectivity

Has the project affected vehicle travel times?

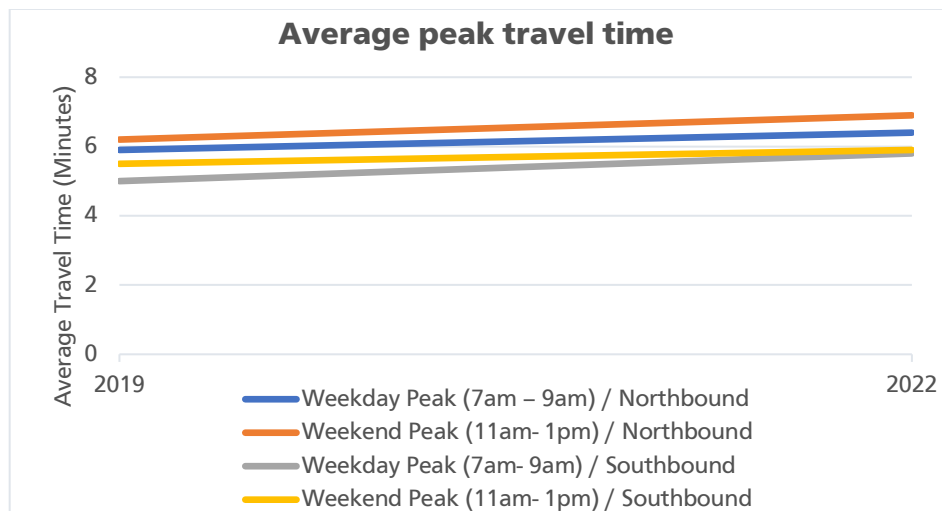


Vehicle travel time along the corridor increased slightly, but not so much that the schedule of a typical motorist would be affected.

The project team assessed the effects of roadway changes on traffic operations of motor vehicles driving along the Embarcadero. In particular, vehicle travel time – how long it takes a motorist to reach point A from point B – is an essential metric for many users of the Embarcadero.


This metric compares northbound vehicle travel time between Townsend Street and Broadway in 2019 and 2022. The project team measured travel times during weekday AM and weekend mid-day peak periods to capture periods when staff expected traffic congestion to be highest along the corridor.

Due to various factors, including a reduction in the number and width of motor vehicle travel lanes on the Embarcadero, modifications to the Washington and Broadway intersections, and broader travel trends due to the COVID-19 pandemic, vehicle travel times increased along the Embarcadero. The following chart provides a summary of the results for the metric:



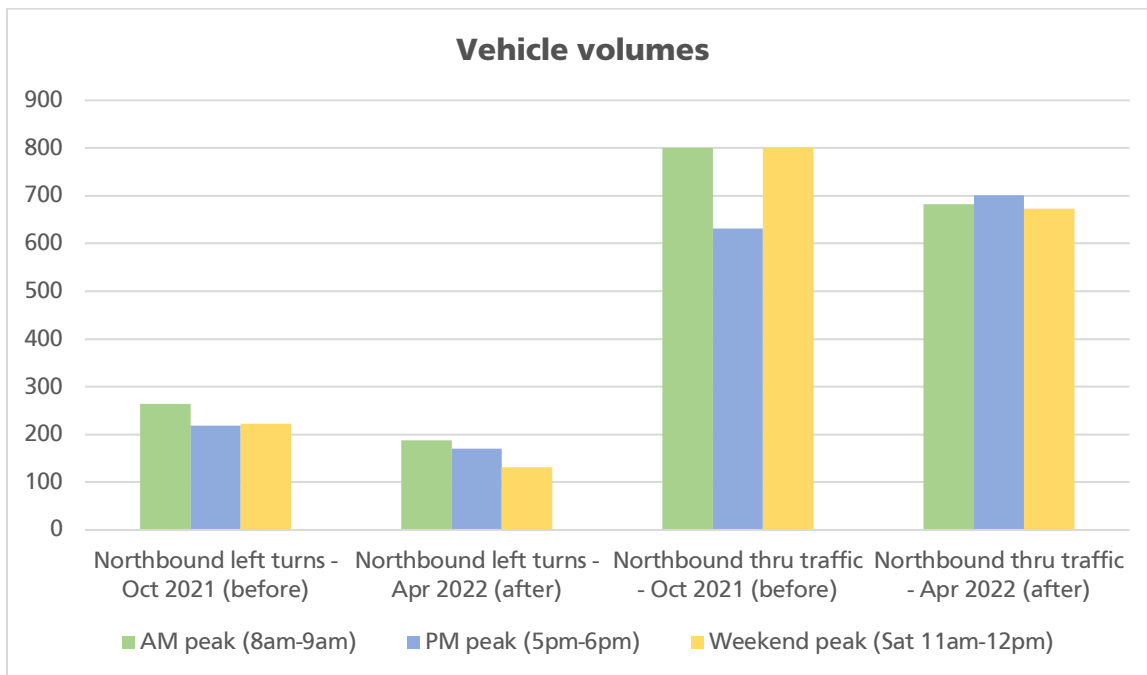
These results show minimal travel time impacts for vehicle traffic on the 1.4-mile evaluation segment — consistent with, if not slightly better than, what staff had predicted during the project’s planning phase. People driving experienced a maximum delay of 40 seconds compared to the 2019 peak periods, representing an increase of 11%. Predictably, travel time impacts are higher for northbound traffic adjacent to the two-way bikeway. Effects are also higher during the weekend peak compared to the weekday peak.

How has the performance of the Broadway intersections changed?



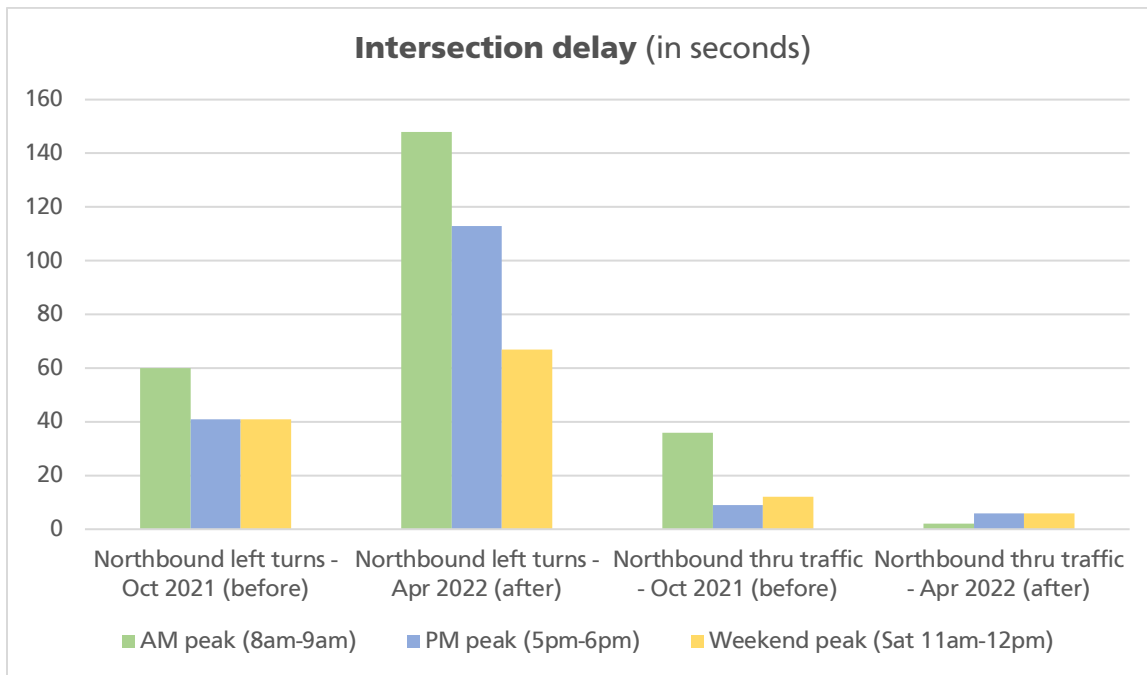
The reconfiguration of lanes approaching Broadway has resulted in additional delay for left-turning vehicles. Traffic analysis suggests an alternative lane configuration may improve the performance of the intersection. Staff recommends a ‘field test’ of this alternative.

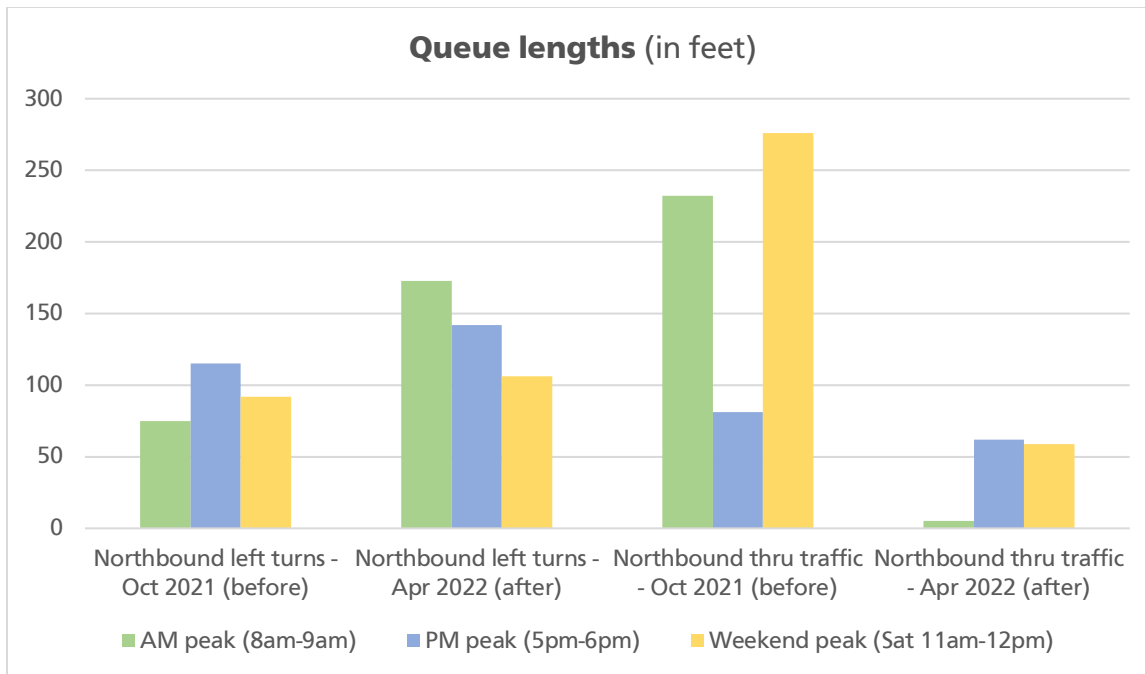
The project brought travel-lane changes to the northbound approaches to the Broadway intersection to make space for the two-way protected bikeway, maintaining the number of through lanes at two but reducing the number of left-turn lanes from two to one. This metric reviews changes in intersection performance at this intersection, including vehicle volumes, intersection delay duration, and queue lengths.



Vehicle volumes are a count of the number of vehicles making a particular movement at an intersection – in this case, northbound traffic making a left turn onto westbound Broadway and northbound through (shortened to "thru" above) traffic continuing straight on the Embarcadero.

Both northbound left and northbound through volumes decreased during most peak periods, especially during the weekday AM-peak and weekend mid-day periods, with 15% decreases in vehicle counts for both. This reduction partly reflects variation in day-to-day traffic patterns and could also be related to evolving changes in return-to-workplace policies. The extent to which the project's changes may have resulted in traffic moving onto other streets is unclear.

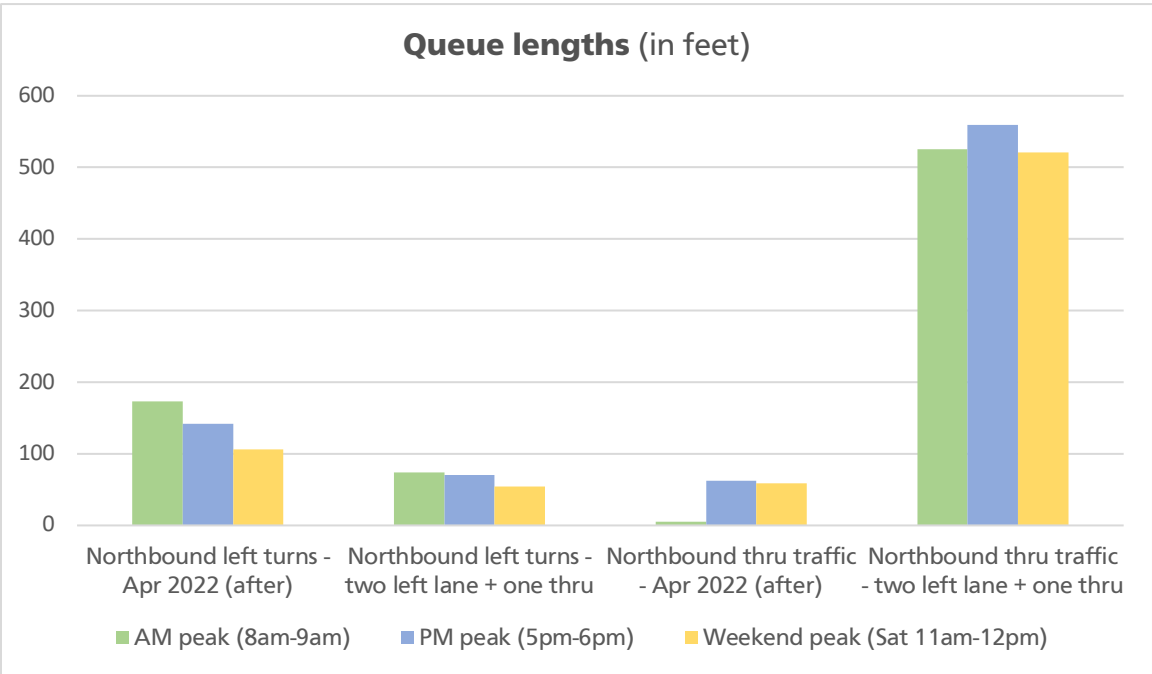
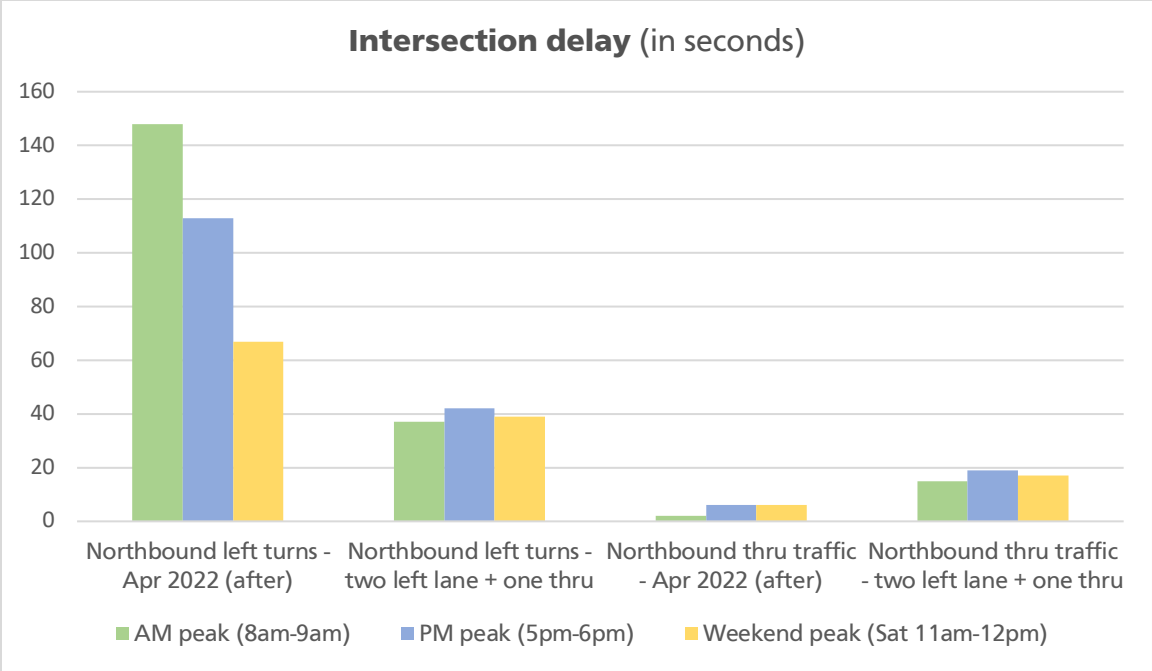




Intersection delay reflects the outputs of a model which estimates the average number of seconds a driver will spend waiting to make a particular movement. It should not be viewed as absolute, as someone may approach the intersection at a moment when they experience more or less delay. **Queue lengths** also reflect the outputs of a model which estimates the distance in feet of queued vehicles waiting for a traffic signal to turn green. We use the median (50th percentile) queue length in feet – half of the queues will be longer, and half of the queues will be shorter than this figure.

The outputs show that with the project’s changes, the single left-turn lane from northbound Embarcadero onto westbound Broadway is ‘oversaturated’ during weekday AM-peak and PM-peak periods. This condition results in vehicle queues exceeding the length of the left-turn lane, sometimes spilling out into the left-most through travel lane, thereby adding to general corridor congestion.

We also modeled an alternative lane configuration approaching the Broadway intersection where there would be two left-turn lanes onto westbound Broadway (as before the project) and a single through lane to continue northbound on the Embarcadero. The model’s results show that this layout would improve the overall performance of the intersection as more green time would be provided to the through movement, allowing a single lane to sufficiently serve demand.



With the alternative two left-turn lanes + one through lane configuration, the outputs show that left-turning drivers (onto westbound Broadway) would experience much less delay and shorter queues. Northbound through traffic would experience approximately 13 seconds additional delay during weekday peak periods and 11 seconds mid-day on weekends. Vehicle queues are expected to grow to approximately 500 feet – extending south of the Pier 5 mid-block crosswalk, north of Washington Street. While queues would

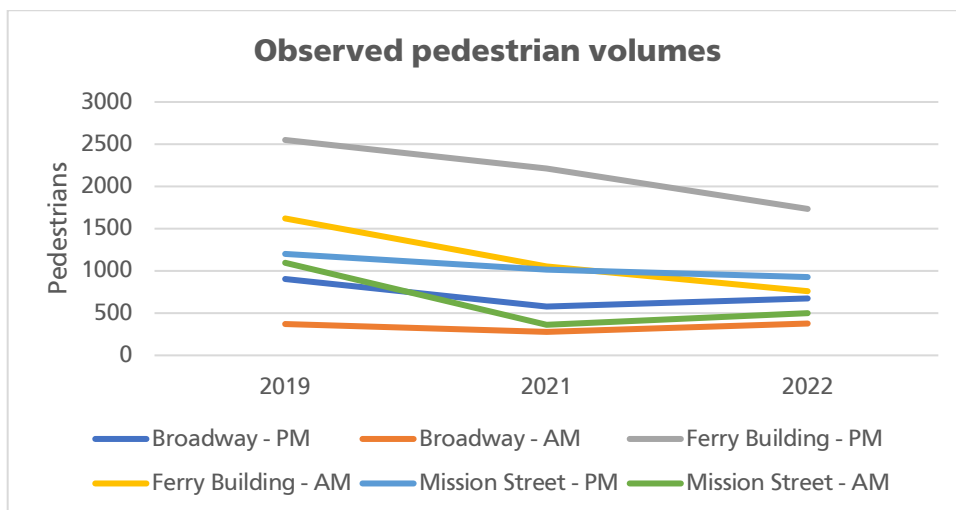
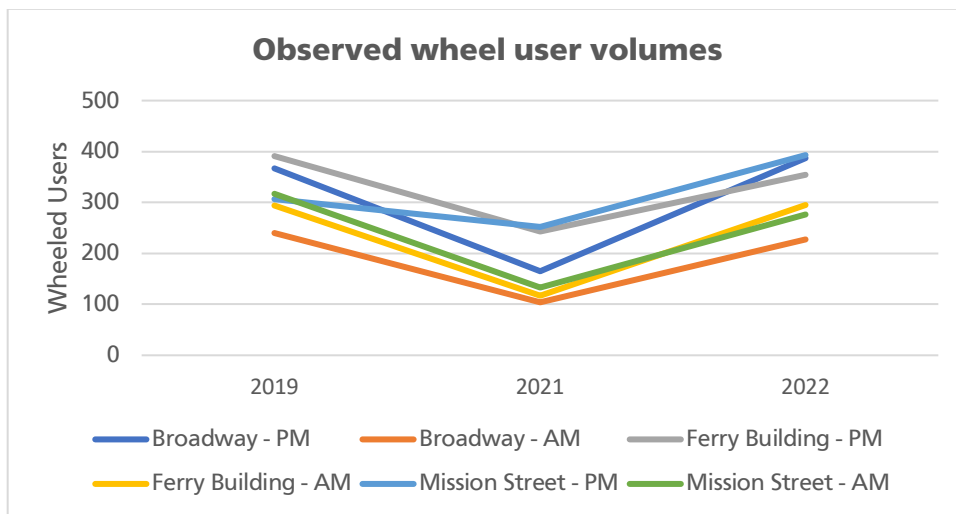
be visibly longer, most waiting traffic would clear during each signal phase as additional green time would be provided for the northbound through movement.

Are more people riding on the Embarcadero corridor?



Less people are using the Embarcadero corridor overall, but wheeled user volumes are similar to pre-pandemic levels.

The protected bikeway along the Embarcadero is intended to attract wheeled users of all ages and abilities. In contrast, the formerly unprotected bike lanes may have been unappealing to many people. To evaluate the effectiveness of the bikeway design changes in attracting new wheeled users to use the Embarcadero, the project team compared post-implementation user counts to counts from 2021 and 2019 (pre-pandemic).



Between 2019 and 2022, pedestrian volumes fell by an average of 37.3% and 76.9% during the weekday PM and AM peak periods, respectively, at Broadway, Mission Street, and the Ferry Building Crosswalk. However, wheeled user volumes increased by an average of 7.6% during the PM peak period and fell by 6.6% during the AM peak period. This data suggests that although COVID-related travel trends continue to depress pedestrian volumes along the Embarcadero, biking and rolling are less affected by these trends and/or the bikeway has attracted new users to the corridor.

Are people riding in the Washington bikeway?

	Following installation of the new bikeway on Washington Street, bike volumes remained similar to pre-pandemic counts.
---	--

The project made bikeway improvements on Washington Street to connect to the Embarcadero bikeway. The project team took peak hourly counts of bike/scooter riders entering and exiting the Washington Street bikeways at the Embarcadero intersection to observe the demand for this new facility.

Peak Hourly Bicycle Counts		
	2019	2022
Weekday AM Peak	5.5	9
Weekday PM Peak	14.5	12

The counts did not show a noticeable increase in volumes of people bicycling and riding scooters on Washington Street after the installation of the new bikeways. This result could be due to unfamiliarity with the new bikeway, lack of connectivity to other bikeways (it only extends one block to Drumm Street currently), and broader travel trends related to the ongoing pandemic and gradual return-to-office plans.

Potential opportunities exist to extend and connect the Washington Street bikeway with existing bike lanes on Davis Street and to a planned two-way protected bikeway on Battery Street. These connections would likely make the Washington Street connection with The Embarcadero more useful.

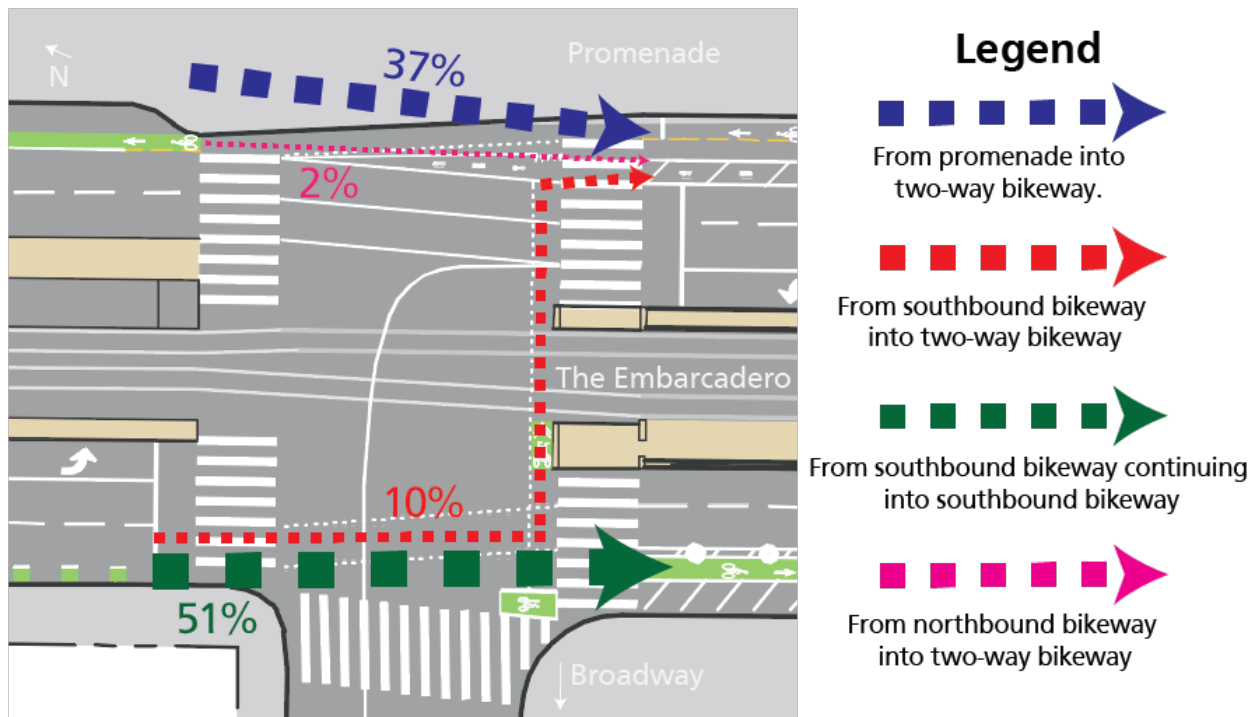
Are bike/scooter riders able to enter/exit the bikeway easily at Broadway (enter) + Folsom (exit)?

	<p>The transition from one-way to two-way bikeway at either end of the project area can be challenging for southbound wheeled users.</p>
---	--

This metric reviews how people enter the two-way bikeway at Broadway and exit at Folsom Street. The project team observed wheeled users during a PM-peak period to gain insight into wheeled users' travel paths into and out of the two-way bikeway.

At Broadway, southbound bike/scooter riders approaching Broadway in the on-street bike lane must choose whether to continue on the city side or make a 'two-stage' turn to enter the two-way waterside bikeway via either a demarcated bike crossing or the pedestrian crosswalk. Additionally, some southbound users approach the intersection via the promenade. The travel paths of observed users are summarized below.

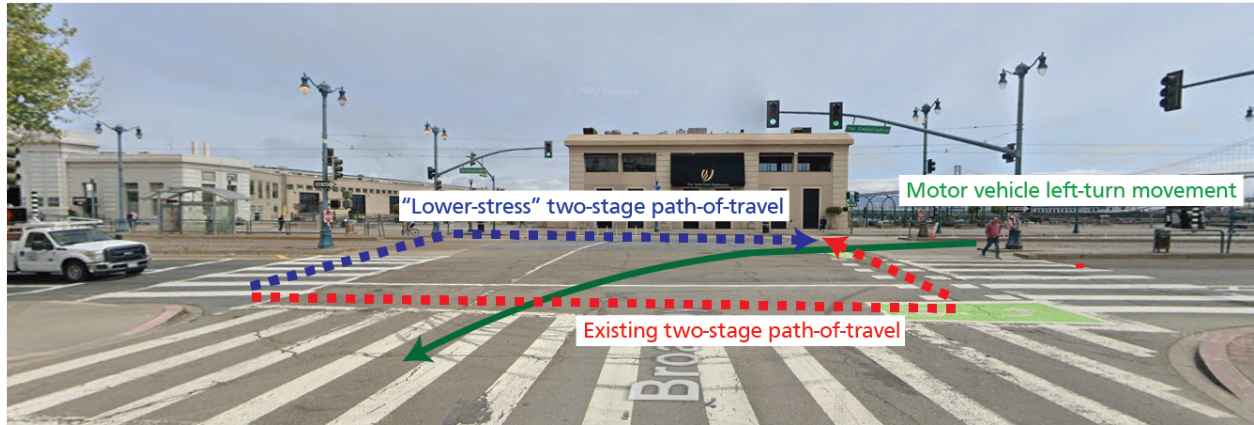
Share of southbound users by path-of-travel at Broadway



Few users were observed transitioning from the city-side bike lane to the waterside two-way bikeway. Additional enhancements to pavement delineation and wayfinding signage could improve its utilization. If the Broadway intersection is reconfigured to two left-turn lanes and a single thru lane, the two-way bikeway could be extended, and the bike crossing moved to the north side of the intersection (see figure below). This change would eliminate conflicts with the left-turn phase and reduce wheeled users' exposure to

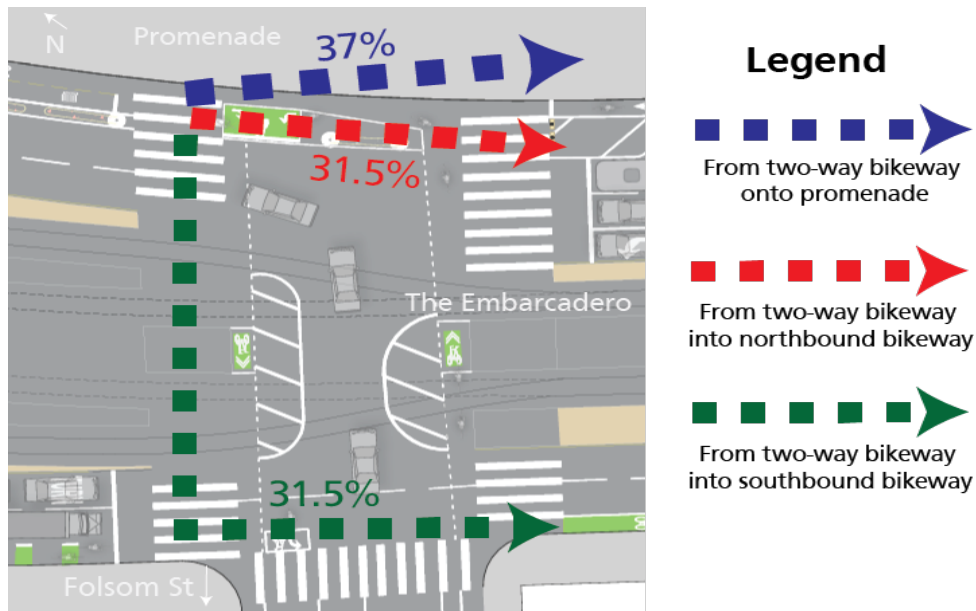
motor vehicle traffic. It could also improve the visibility of the waterside bikeway, encouraging more people to use it.

Existing and potential two-stage turn movements at Broadway



At Folsom Street, southbound users must transition from the bikeway into one-way on-street bike lanes on the city side, onto the shared-use promenade, or continue straight riding illegally "contraflow" in the northbound bikeway. Ideally, southbound wheeled users move to the southbound city side bike lane via the two-stage turn queue box. The travel paths of observed users are summarized below.

Share of southbound users by path-of-travel at Folsom Street



Only one-third of users move to the city side bike lane at Folsom Street, with most moving onto the promenade or illegally continuing straight against traffic. The extension of the two-way bikeway farther south should be evaluated to accommodate these users.